cool in the spring and summer and relatively warm n the fall and winter, is the dominating factor in determining the weather of this region.

At Escanaba, Mich., on account of its location on the western shore of Little Bay de Noc, an arm extending northward from the northern end of Green Bay, the weather is greatly modified by local influences. Daily temperature changes during the spring, summer, and fall are dependent largely upon the direction of the wind with regard to the waters of the bay. The temperature of Green Bay, owing to its landlocked position, rises very slowly in spring. For this reason, except in extreme cases, cool weather may be forecast with safety from April to September whenever it is expected that the wind will shift to the south or southeast, or warmer when the wind is expected to shift to the southwest or west. So pronounced is this effect that in the case of a rapidly shifting wind the rise and fall of temperature are often too rapid for the thermograph to follow, sometimes amounting to 10° or 15° in as many minutes. During the seasons mentioned the warmest days at Escanaba come with a southwest or west wind, when a barometric depression is moving eastward over Lake Superior, and the highest temperature occurs when the low is central toward the eastern end of the lake. This, evidently, is simply a case of warmer air coming from off the land, and if it accompany a rapidly moving disturbance the warm weather will be of brief duration, a sharp fall in temperature occurring when the wind shifts to northwest.

In forecasting for this region it should be borne in mind that barometric depressions will usually decrease in energy as they approach the Lakes during the spring and early summer and increase during the fall and winter, the apparent reason being that convectional action is less energetic over the relatively cool waters in the former season and greater over the relatively warm waters in the latter.

During the spring and early summer it is unsafe to forecast precipitation from an approaching low so long as the wind is expected to come from Green Bay; the obvious reason is that as the air passes from the water to the land its temperature rises, which increases its capacity for the vapor of water. During the season mentioned it is also unsafe to forecast thunderstorms with a southeast or south wind, except in pronounced cases. Thunderstorms often may be seen approaching from the west when the wind is from the southeast or south, but when almost overhead, and when thunder is momentarily expected, they begin to dissolve, and soon only a few strato-cumulus clouds are left. Thunderstorms require for their continued action an abundance of warm, moist air near the ground. While the air from over Green Bay probably contains sufficient moisture, its initial temperature is too low to give it the necessary ascending movement. Late in the summer, when the waters of Green Bay become warmer, this effect is less noticeable.

During the fall, winter, and spring, when a high is in the St. Lawrence Valley, and a low is approaching from the west, the sequence of changes attending the passage of a cyclone should be forecast only with extreme caution. Under these conditions the low may remain nearly stationary for two or three days, or it may even move westward. From Bowie's method of determining the probable movement of a depression this is what should be expected; and if it be remembered that the high appears to have difficulty in getting out of the St. Lawrence Valley, and is itself likely to remain practically stationary for forty-eight hours, this method may be used in these cases with a high degree of success.

Cold waves should be forecast for Escanaba only under exceptional conditions. Owing, probably, to the protection afforded by Lake Superior, cold waves are felt much more severely both to the eastward and to the westward than at Escanaba. A cold wave approaching from the northwest, which would appear likely to pass directly over this station, will usually be diverted to the westward, and extremely cold weather will arrive about twenty-four hours late, that is, when the crest of the high is well down the Mississippi Valley and the wind has backed to the southwest. In these cases it is usually 10° colder at Green Bay than at Escanaba. Another class of cold waves, coming apparently from Hudson Bay, passes southward over the eastern end of Lake Superior. The cold from these highs comes very quickly, but the temperature is usually 15° to 20° lower at Sault Sainte Marie than at Escanaba.

LIGHTNING PHENOMENA.

By Dr. Irving Langmuir. Dated Stevens Institute, Hoboken, N. J., September 11, 1907.

I have read with interest an account of a peculiar phenomenon in connection with a flash of lightning, on page 228 of the May, 1907, number of the Monthly Weather Review.

I have also seen such phenomena and would like to bear testimony to their occurrence on not very rare occasions, at least in the mountains of Switzerland. I remember three storms I have witnessed at different times in which flashes of lightning left their paths distinctly marked by strings of fire beads. Two of these storms were in the Alps, one at Berchtesgaden in southern Germany, and one on the mountain near Lake Lucerne, in Switzerland. The third was at Jackson, N. H., in the White Mountains. Each of these three storms was exceptionally violent, among the most violent I have ever witnessed. The phenomenon was observed only with flashes which were comparatively close, within perhaps 2000 feet. In each storm several flashes left beaded trails, but not every flash which struck near by exhibited that peculiar appearance.

I should estimate the time during which the beads remained visible as at least one second, a time amply sufficient to observe distinctly. It appeared to me that the whole course of the flash remained luminous, with a dull red glow, but that at intervals along the path bright points like sparks appeared to remain suspended in the air. The sparks appeared to be moving horizontally as tho blown along by the wind.

I have spoken many times with others about the phenomenon, but have met no one, even among experienced mountaineers, who had observed anything like it. I had, therefore, begun to suspect that the phenomenon was of a subjective nature, that is, was due to some peculiar impression left upon the retina of the eye by the brilliant discharge. The appearance of the sparks drifting along with the wind is strong evidence against this theory.

SALTON SEA AND LOCAL CLIMATE.

An editorial in the New York Daily Tribune of March 4, 1907, suggests that the Weather Bureau should have at hand data to decide whether the formation and presence of the Salton Sea has an appreciable influence on local climate. Now, without waiting for special local observations of temperature or moisture, we can easily demonstrate the slight influence of this sea on the general climate, especially on the rainfall.

The Salton Sea has an estimated area of 400 hundred square miles and an average depth of less than 80 feet. The total volume of water may be 400 by $(5280)^2$ by 70 cubic feet,[1] equivalent to a depth of 28,000 feet over 1 square mile, or 1 foot over 28,000 square miles, or about 2 inches over the 158,000 square miles of California, and is much less than falls in almost any one area of low pressure during the few days of its progress over the United States. This amount of water would suffice to provide for the irrigation of the whole 300 square miles of the Imperial Valley for forty or fifty years, if that region required only 20 inches in depth per annum. Therefore the practical question is not how much the Salton Sea can affect climate, but how its waters can be used for irrigating the lands that surround it.—*C. A.*

[1] As estimated by Mr. A. P. Davis. See his paper in the National Geographic Magazine, January, 1907.